

THE POLYPLACOPHORA OF LORD HOWE AND
NORFOLK ISLANDS.

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(Plates xi.-xiii.)

The only reference to the Polyplacophora of Lord Howe Island known to us, occurs in Memoirs No.2 of the Australian Museum, "Lord Howe Island, Its Zoology, Geology, and Physical Characters." (Sydney, 1889). In the portion of this Memoir devoted to General Zoology, the following paragraph appears:—"The Chitonidæ are sparsely represented by a small *Chiton*, and two species of *Anthochites*, and were attached to stones on the Coral-reef." No description of these shells was published, and the present whereabouts of the specimens collected is not known to us. The Norfolk Island Polyplacophora appear to have been entirely neglected.

One of us (A.F.B.H.) spent three weeks at Lord Howe Island in 1907, and five weeks at Norfolk Island in 1908. During these visits, every accessible reef and rock-pool on each Island was thoroughly searched, and a fairly good collection of the group was made. The services of local residents have since been requisitioned, but the result did not add any new species to the collection, and confirmed the conclusions already arrived at as to the comparative rarity of certain species.

These results have been carefully worked out, and the following descriptive list of nine species, hitherto undescribed, is now presented.

Five genera are represented, viz.:—*Chiton*, *Ischnochiton*, *Onithochiton*, *Acanthochites*, and *Lepidopleurus*. Four species are peculiar to Lord Howe Island, three are peculiar to Norfolk Island, and two are common to both localities. None of them

are common to either the mainland of Australia or to New Zealand, although two species are very closely allied to mainland species. The shells are all of small dimensions, and the absence of the large continental forms of *Plaxiphora*, *Acanthopleura*, *Eudoxochiton*, and *Lorica* is remarkable, especially as *Plaxiphora* and *Eudoxochiton* occur on the Kermadec Islands. The absence of *Ischnochiton* from Lord Howe Island, and of *Onithochiton* from Norfolk Island is perhaps remarkable, but the latter genus may yet be found at Norfolk Island in deeper water than that explored. No general resemblance to either Australian or New Zealand forms can be definitely traced, but the fauna of both Islands is related. Mr. Tom Iredale considers that the Chiton fauna of Lord Howe and Norfolk Islands is nearly related to that of the Kermadecs, and more distantly to that of New Caledonia.* (Mr. Iredale had seen the specimens now described).

The physical characters of both Islands are similar, both being of basaltic formation, and both possessing coral reefs. Lord Howe is the furthest south of the Islands having coral reefs.

The Islands composing the Lord Howe, Norfolk, and Kermadec groups are small in size. Considering this, and the great distance of sea which intervenes between them, it is remarkable how much their fauna has in common. And here the Polyplacophora repeat conclusions drawn not only from the marine fauna in general, but also from the terrestrial fauna and flora. Beyond this inter-island affinity the fauna and flora next express a kinship with those of New Zealand and New Caledonia. Lastly, the neighbourhood of the Australian continent has made an impression, especially on the nearer island. One of us proposed† to express these conditions by grouping these Islands in a separate subregion, the Philippian.

The types of the new species here described have been presented to the Australian Museum.

* Iredale, Proc. Malac. Soc. ix., 1910, p.162.

† Hull, The Birds of Lord Howe and Norfolk Islands. Emu, xi., 1911, p 58.

1. *LEPIDOPLEURUS NORFOLCENSIS*, n.sp.

(Plate xi., figs. 1, 1a, 1b, 1c.)

Shell small, elongated, low. Colour buff.

Anterior valve ornamented by radial and concentric rows of small close pustules, increasing in size and spacing towards the margin.

Posterior valve: mucro prominent, central; posterior slope even; clothed with close concentric rows of pustules.

Median valves: lateral areas slightly raised, not distinctly differentiated. The pustules on the central areas are inclined to longitudinal arrangement, those on the lateral areas are more transverse.

Girdle broad, beset with small scales and spicules, the latter developing a marginal fringe.

Length 6 mm., breadth 3.5 mm.

Station.—Under loose stones at low tide.

Habitat.—Norfolk Island.

Remarks.—This shell is not common. It differs from the Australian species *L. badius* Hedley & Hull, in the more regular arrangement and larger size of the pustules.

2. *LEPIDOPLEURUS CATENATUS*, n.sp.

(Plate xi., figs. 2, 2a, 2b, 2c.)

Shell small, elongated, low. Colour cream.

Anterior valve with numerous rows of pustules, arranged radially and connected by short links, giving the appearance of concentric rings. The posterior margins raised, and more densely and irregularly pustulose.

Posterior valve: mucro prominent, slightly behind the middle, the anterior half sculptured with longitudinal rows of pustules, the posterior half with radial rows.

Median valves: lateral areas raised posteriorly; latero-pleural areas sculptured with 12-14 longitudinal rows of rounded pustules connected each to its fellow in the neighbouring row by low, slight, transverse links. On the central areas the rows are

straight and set closer together, becoming increasingly concave to the axis as they recede.

Girdle narrow, beset with minute scales.

Length 4.5 mm., breadth 2.5 mm.

Station.—On the under side of smooth stones.

Habitat.—Lord Howe Island.

Remarks.—This shell is rare and local, only one small colony of 5 or 6 specimens being taken on a piece of basalt shingle in an open channel in the rocks at Ned's Beach, on the eastern side of the Island. It is unlike any of the Australian or New Zealand species of the genus, and is remarkable for its prominent sculpture, and the curious differentiation in the arrangement of pustules on the posterior valve.

Mr. Iredale took, on the Kermadecs, an undescribed species related to this.

3. ISCHNOCHITON INTERMEDIUS, n.sp.

(Plate xi., figs. 3, 3a, 3b, 3c.)

Shell rather depressed. Colour variable, either a monochrome of olive, ochraceous, cream, pale, or dark brown, or variegated with these tints, frequently with a dark or pale dorsal stripe.

Anterior valve with numerous fine, irregular, radiating riblets.

Posterior valve: mucro elevated, central, with radiating riblets upon the posterior half, fewer and coarser than those of the anterior valve; anterior half similar to the central area of the median valves.

Median valves: lateral areas with 4-6 faint irregular granular riblets; central areas not differentiated from the jugal tract, sculptured as in allied forms.

Girdle densely clothed with minute scales.

Interior blue, sinus broad and shallow; anterior valve having 12, median 1-1, and posterior valve 12 slits.

Length 19 mm., breadth 9 mm.

Station.—On the under surface of loose stones in shallow water, in sheltered pools.

Habitat.—Norfolk Island.

Remarks.—This shell is extremely common, and appears to occupy a position intermediate between *I. crispus* Reeve, of Australia, and *I. longicymba* Quoy, of New Zealand. Compared with *I. crispus*, the novelty is more elevated, has more definitely sculptured lateral areas, and is especially distinguishable from both *I. crispus* and *I. longicymba* by the extremely minute girdle scales.

A similar, if not identical, species was found by Mr. T. Iredale on Raoul or Sunday Island, Kermadec Group.*

4. ACANTHOCHITES LEUCONOTUS, n.sp.

(Plate xii., figs. 4, 4a, 4b, 4c, 4d, 4e, 4f.)

Shell elongated, valves carinated. Colour white, 5th and 6th median valves frequently with green spot on each side, the tip and sometimes the valve suffused with pink.

Anterior valve with 5 strong radiating pustulose costæ.

Posterior valve similar to median valves, but without the prominent rib.

Median valves: latero-pleural areas irregularly pustulose, the pustules on the lateral areas larger and less in number than those on the central areas; the two areas separated by a ray of prominent pustules which increase in size towards the margin.

Jugal tract not elevated, margined with pustules, V-shaped, transversely striate.

Girdle broad, beset with short white spicules, and having 9 bunches of long white spicules on each side.

Interior pearly-white, sinus broad, shallow. Anterior valve having 5, and median valve 1-1 slits. The posterior valve has 3 almost obsolete slits, edge thickened.

Length 12 mm., breadth 5.5 mm.

Station.—On the under side or at the edge of the insertion in the sand of small smooth stones, in pools or channels, at low tide.

Habitat.—Lord Howe Island.

* Iredale, Proc. Malac. Soc. ix., 1910, p.161.

Remarks.—This very striking shell is frequently found on the black polished basalt shingle, and its brilliant white colour is in marked contrast with its surroundings. It resembles the Australian *A. costatus* in the strongly ribbed anterior and median valves, but differs from that species in the size and shape of the pustules: is broader and more elevated.

5. ACANTHOCHITES APPROXIMANS, n.sp.

(Plate xii., figs. 5, 5a, 5b, 5c, 5d, 5e, 5f.)

Shell elongated, elevated, carinated. Colour pale yellow, flamed with dark to pale olive-brown.

Anterior valve densely sculptured with elongated pustules arranged in radiating rows.

Posterior valve similarly sculptured, but pustules more separated and less regularly arranged; dorsal area similar to median valves; mucro sub-prominent, in front of the middle.

Median valves: latero-pleural areas not differentiated, sculptured with irregular radiating rows of flattened pustules; dorsal areas broadly wedge-shaped, convex, longitudinally deeply striate, the striae crossed by growth-lines.

Girdle olivaceous, densely clothed with rather long spicules; sutural tufts large, silvery.

Interior white; sinus broad, shallow, minutely crenulate. Anterior valve having 5, and median valves 1-1 slits. Posterior valve with two slits separated by a posterior sinus.

Length 11 mm., breadth 4.5 mm.

Station.—On the under side of stones, or in the interstices of coral rock, in pools at low tide.

Habitat.—Lord Howe and Norfolk (type-locality) Islands.

Remarks.—This shell is rare in both localities. It closely resembles the Australian species, *A. granostriatus* Pilsbry, particularly in colour-pattern, but the grains on the Australian species are fewer and more prominent, and the head-valve of the Island species lacks the incipient ribs of *A. granostriatus*.

Note.—The figure of the entire shell shows the colour-pattern; the details show the sculpture.

6. CHITON CORYPHEUS, n.sp.

(Plate xii., figs.6, 6a, 6b, 6c.)

Shell elevated, carinated, side slopes convex, of medium size. Colour extremely variable, both in shade and pattern, yet two groups appear, one lighter and the other darker. The girdle is usually tessellated with light and dark. A line along the dorsal area is apt to be differentiated by being lighter or darker than the rest. Frequently the umbones are tipped with pink. Sometimes one or two valves oppose a sharp contrast to the rest. No monochromes appear; buff, olive-green, pink, and rarely white display an infinite variety of splashes or marbling.

Anterior valve with 14-18 strongly raised granular riblets, increasing in size towards the margin; in mature examples the riblets are multiplied by splitting of the fewer radii of the younger shell.

Posterior valve: mucro prominent, in front of the centre, with 14-16 radial riblets similar to anterior valve; central area similar to median valves.

Median valves: lateral areas raised, with 2-4 prominent granular riblets with shorter ones intercalating with age; central areas furrowed by 8-10 longitudinal sulci becoming obsolete anteriorly; jugal tract smooth and polished.

Girdle unusually broad, scales finely transversely striate, polished at the margin.

Interior, green becoming paler at the margin. Sinus narrow and deep. Anterior valve having 8, median 1-1, and posterior valve 10 slits.

Length 18 mm., breadth 10 mm.

Station.—On the under surface of loose stones in pools on the coral reef; on the under side of or in the interstices between large basalt boulders, or on the surface of the rock in "pot-holes."

Habitat.—Norfolk Island.

Remarks.—This handsome shell is very plentiful at all points on the coast. On the coral reef at Emily Bay and amongst the sheltered rock pools at Bumboras Bay, immature examples are common, and show a wonderful variation in brilliancy of colour-

ing. At the Cascade landing place and in other positions more exposed to the full force of the surf, mature examples are found wedged in between the basalt boulders. These are mostly very dark in colour, and frequently eroded or covered with marine growths.

This shell appears to approach *C. discolor* Soubervie, of New Caledonia, but differs from that species in the fewer radial ribs on the end valves, and the fewer and less anteriorly prolonged sulci in the central areas. *Chiton caudiculatus* Quoy and Gaimard, from New Zealand, is also related, but is more elevated and sharper-keeled, and has a harsher sculpture. A similar, if not identical, species was found by Mr. T. Iredale on Raoul or Sunday Island, Kermadec Group.*

7. *CHITON HOWENSIS*, n.sp.

(Plate xiii., figs. 7, 7a, 7b, 7c, 7d, 7e, 7f, 7g.)

Shell strongly elevated, carinated, side slopes curved and steep. Colour very variable, creamy white, maculated with pink, purple, or brown, chiefly on the end valves and lateral areas; central areas green, jugal tract paler, the whole shell finely mottled in colour.

Anterior valve with 8-10 somewhat irregular wavy concentric riblets.

Posterior valve: mucro prominent, in front of the centre; posterior slope convex, concentrically ribbed similarly to the anterior valve, but with slight radial depressions.

Median valves strongly raised, deeply transversely ribbed with irregular wavy riblets which are traversed by a shallow depression. Central areas smooth; jugal tract finely transversely striate.

Girdle irregularly tessellated with broad bands of purple-brown, with scattered deep green scales. Scales small, densely imbricating, striate, polished on the margins.

Interior bluish-white; sinus broad, denticulate. Anterior valve having 10, median valves 1-1, and posterior valve 12 slits. Teeth very finely pectinate on the edge.

* Iredale, Proc. Malac. Soc. ix, 1910, p. 161.

Length 18 mm., breadth 9 mm.

Station.—On the under side or at the edge of insertion in the sand of small smooth stones, in sheltered pools, at low tide.

Habitat.—Lord Howe Island.

Remarks.—This delicately tinted shell is rather common in the pools of the fringing reef on the eastern side of the Island, where a quantity of smooth basalt shingle and waterworn coral rock has accumulated. The animal is alert (as compared with other members of the genus), and upon being removed from its position or disturbed, quickly contracts and drops off, in this respect resembling the *Ischnochiton*. It is not closely allied to any other Australasian *Chiton*.

8. *CHITON FUNEREUS*, n.sp.

(Plate xiii., figs. 8, 8a.)

Shell broad, elevated, carinated, side slopes almost straight. Colour dark green or black, rarely red-brown, occasionally flamed with lighter.

Anterior valve densely covered with small rounded pustules, which tend to radial and concentric arrangement.

Posterior valve irregularly pustulose, mucro prominent, in front of the middle.

Median valves: lateral areas raised, strongly ribbed with 3-4 pustulose riblets, bifurcating towards the margin; the pustules of the lateral areas extending into the outer angles; central areas finely sculptured with irregular wavy lines.

Girdle alternately banded with light and dark; densely clothed with large scales, not polished, striate.

Interior deeply bluish-green, sinus broad, shallow; anterior valve having 10-12, median 1-1, and posterior valve 12 slits.

Length 13 mm., breadth 9 mm.

Station.—Under stones on the coral reef and elsewhere at low tide.

Habitat.—Lord Howe Island (type-locality), and Norfolk Island.

Remarks.—Very common in all localities sheltered from the direct force of the surf. A similar, if not identical species was

found by Mr. T. Iredale on Raoul or Sunday Island, Kermadec Group.*

ONITHOCHITON DISCREPANS, n.sp.

(Plate xiii., figs. 9, 9a, 9b, 9c, 9d, 9e, 9f.)

Shell elevated, the dorsal ridge rounded. Colour olive-buff, variably flamed with orange, wood-brown, and green. The colour of different specimens varies considerably: in some the orange predominates, others are chiefly green.

Anterior valve having 8 or 9 radiating ribs, distinctly raised, and concentrically grooved, separating 9 or 10 rows of ocelli: the posterior margin of the valve with smooth thickened ridge.

Posterior valve smooth, mucro posterior.

Median valves moderately beaked, the lateral areas raised, radially grooved by 4 to 6 furrows; rows of ocelli between the anterior rib and the furrows. Central areas with shallow sulci originating at and denticulating the anterior rib and vanishing towards the margin.

Girdle leathery, two-thirds the width of exposed portion of valves, pale yellow, veined with orange-brown; densely clothed with microscopic down.

Interior pearly-white; sinus broad, deep, denticulate. Anterior valve having 8 and median valves 1-1 slits.

Length 19 mm., breadth 12 mm.

Station.—In interstices of waterworn fragments of coral rock, or attached to the rocky sides of pools in the reef at low tide.

Habitat.—Lord Howe Island.

Remarks.—This shell is not plentiful. Its habit of occupying holes in stones somewhat resembles that of *Cryptoplax*. Compared with the Australian *O. quercinus*, the new species is apparently far smaller. In the median valves of *O. discrepans* the eye-rows part radial from transverse ridges, whereas uninterrupted transverse ridges prevail in *O. quercinus*. The anterior valve of the Australian form is concentrically furrowed, but in the Lord Howe Island species radial ridges are dominant.

* Iredale, Proc. Malac. Soc. ix., 1910, p.161.

EXPLANATION OF PLATES XI.-XIII.

Plate xi.

Figs. 1, 1a, 1b, 1c. — *Lepidopleurus norfolcensis*.

Figs. 2, 2a, 2b, 2c. — *Lepidopleurus cutenatus*.

Figs. 3, 3a, 3b, 3c. — *Ischnochiton intermedius*.

Plate xii.

Figs. 4, 4a, 4b, 4c, 4d, 4e, 4f. — *Acanthochites leuconotus*.

Figs. 5, 5a, 5b, 5c, 5d, 5e, 5f. — *Acanthochites approximatus*.

Figs. 6, 6a, 6b, 6c. — *Chiton corypheus*.

Plate xiii.

Figs. 7, 7a, 7b, 7c, 7d, 7e, 7f, 7g. — *Chiton howensis*.

Figs. 8, 8a. — *Chiton funereus*.

Figs. 9, 9a, 9b, 9c, 9d, 9e, 9f. — *Onithochiton discrepans*.